

CLAIMS:

1. A spindle liner for insertion into a draw tube of a lathe or other turning machine for supporting stock to be worked by the lathe or turning machine, the liner comprising:

a plurality of tube sections each having a principal external diameter selected to permit said tube sections to be placed substantially end-to-end in said draw tube and corresponding closely to an internal diameter of the draw tube, each tube section having a tube passageway extending the length of the tube section, a male connector at one end of the tube section, and a female connector at an opposite end of the tube section adapted to connect to the male connector of an adjacent tube section; and

a plurality of tube inserts each adapted to be mounted within the tube passageway of a respective one of said tube sections adjacent said opposite end of the respective tube section, each of said tube inserts defining an axial bore therein through which the stock to be worked can pass in a close fitting manner,

wherein, during use of said liner, said tube inserts are kept in a desired spaced apart relationship by the tube sections.

2. A liner according to claim 1 wherein said male connector is externally threaded and has an outer diameter that is smaller than said principal external diameter, and said female connector is internally threaded with threads matching the threads on said male connector.

3. A liner according to claim 2 including at least one annular groove formed around each tube section and an O-ring made of resilient, flexible sealing material mounted in each annular groove and projecting therefrom.

4. A liner according to claim 1 including two annular grooves formed around each tube section near opposite ends of the respective tube section and an O-ring made of resilient, flexible sealing material mounted in each annular groove and projecting therefrom.

5. A liner according to claim 1 wherein each tube insert has first and second axially extending sections with the first section having a smaller external diameter than said second section, an external annular shoulder is formed on each tube insert between its first and second axially extending sections, and each tube section is formed with an internal annular shoulder located near said female connector of the respective tube section and adapted to engage said external annular shoulder of the tube insert mounted in the respective tube section so as to stop the tube insert from moving further along the tube passageway when said liner is assembled for use.

6. A liner according to claim 5 wherein said first section of each tube insert forms a first portion of said bore and said first portion tapers inwardly from one end of the tube insert over the axial length of said first section.

7. A liner according to claim 1 wherein both said tube sections and said tube inserts are made of a strong, rigid plastics material.

8. A liner according to claim 2 wherein both said tube sections and said tube inserts are made of nylon.

9. A liner according to claim 2 wherein said tube sections are substantially identical to each other and each has a length in the range of 6 to 10 inches.

10. A liner according to claim 1 wherein each tube insert has a cylindrical exterior surface having a uniform diameter extending substantially the length of the tube insert and each tube section is formed with an internal annular shoulder adapted to engage one end of the tube insert mounted in the respective tube section so as to stop the tube insert from moving further along the tube passageway when the liner is assembled for use.

11. A liner according to claim 10 wherein said male connector is externally threaded and has an outer diameter that is smaller than said principal external diameter, and said female connector is internally threaded with threads matching the threads on said male connector.

12. A liner according to claim 11 including at least one annular groove formed around each tube section and an O-ring made of resilient, flexible sealing material mounted in each annular groove and projecting therefrom.

13. A spindle liner for mounting inside a spindle of a lathe or turning machine for supporting stock to be worked by the lathe or turning machine, the liner comprising:

a plurality of tube sections each having a main longitudinal portion with a selected external diameter suitable for insertion of each tube section into a feed passageway provided in said spindle so as to permit said tube sections to be placed substantially end-to-end in said spindle, each tube section defining a tube passageway extending the length of the tube section, said tube sections including connectors for joining said tube sections together in a substantially end-to-end manner; and

a plurality of tube inserts each adapted to be mounted within said tube passageway of a respective one of said tube sections, each tube insert defining an axial insert passageway therein through which the stock to be worked can pass in a close fitting manner,

wherein, during use of said liner, said tube inserts are kept in a desired spaced apart relationship by the tube sections.

14. A spindle liner according to claim 13 wherein said connectors include male and female integral connecting sections at opposite ends of each tube section, said male connecting section being externally threaded and said female connecting section being internally threaded with threads matching the threads of the male connecting section.

15. A spindle liner according to claim 13 wherein the axial insert passageway of each tube insert has first and second axially extending portions, said first portion of said axial insert passageway tapers inwardly from one end of the tube insert to said second portion, and said second portion has a substantially uniform cross-section along its axial length and

transverse dimensions corresponding closely to transverse dimensions of said stock to be worked.

16. A spindle liner according to claim 13 wherein each tube section has at least one annular groove extending around an exterior cylindrical surface thereof and an O-ring made of resilient, flexible sealing material is mounted in said at least one annular groove.

17. A spindle liner according to claim 14 including two annular grooves formed around each tube section near opposite ends of the respective tube section and an O-ring made of resilient, flexible sealing material mounted in each annular groove and projecting therefrom.

18. A spindle liner according to claim 13 wherein each tube insert has first and second axially extending sections with the first section having a smaller external diameter than said second section, an external annular shoulder is formed on each tube insert between its first and second axially extending sections, and each tube section is formed with an internal annular shoulder adapted to engage said external annular shoulder of the tube insert mounted in the respective tube section so as prevent any significant movement of the tube insert along said tube passageway when said liner is assembled and ready to use.

19. A spindle liner according to claim 15 wherein both said tube sections and said tube inserts are molded and are made of a strong, rigid plastics material.

20. A spindle liner according to claim 16 wherein both said tube sections and said tube inserts are molded and are made of nylon.

21. A spindle liner according to claim 14 wherein said tube sections are substantially the same as each other and each has a length in the range of 6 to 10 inches.

22. A spindle liner according to claim 13 wherein each tube insert has a cylindrical exterior surface having a uniform diameter extending substantially the length of the tube insert and each tube section is formed with an internal annular shoulder adapted to engage one end of the tube insert mounted in the respective tube section so as to stop the tube insert from moving further along the tube passageway when the liner is assembled for use.

23. A spindle liner according to claim 22 wherein said connectors include male and female integral connecting sections at opposite ends of each tube section, said male connecting section being externally threaded and said female connecting section being internally threaded with threads matching the threads of the male connecting section.

24. A spindle liner according to claim 22 wherein each tube section has at least one annular groove extending around an exterior cylindrical surface thereof and an O-ring made of resilient, flexible sealing material is mounted in said at least one annular groove.

25. A spindle liner for use in a lathe system for supporting bar stock to be worked by the lathe system, the liner comprising:

a plurality of tube sections each having a substantially cylindrical main section with a selected external diameter suitable for insertion of each tube section into a feed passageway for said bar stock provided in said lathe system and a first integral connector projecting axially from one end of said cylindrical section, the opposite end of said cylindrical section having a second connector so as to be detachably connectible to the first connector of an adjacent one of said tube sections, each tube section having a tube passageway extending the length of the cylindrical section and the first connector; and

a plurality of tube inserts each adapted to be mounted within the tube passageway of a respective one of said tube sections, each of said tube inserts forming a central, axial insert passageway through which the bar stock to be worked can pass in a close fitting manner,

wherein said spindle liner includes means for maintaining said tube inserts in a desired spaced-apart relationship relative to one another when said spindle liner is assembled and ready for use in the lathe system.

26. A spindle liner according to claim 25 wherein said first integral connector has external threads and said second connector comprises internal threads formed within said cylindrical main section.

27. A spindle liner according to claim 25 including at least one annular groove formed around said cylindrical main section and an O-ring made of resilient, flexible rubber or rubberlike material mounted in each annular groove and projecting therefrom.

28. A spindle liner according to claim 27 wherein each tube insert has first and second axially extending sections with the first section having a smaller external diameter than said second section, an external annular shoulder is formed on each tube insert between its first and second axially extending sections, and each tube section is formed with an internal annular shoulder located near said second connector of the respective tube section and adapted to engage said external annular shoulder of the tube insert mounted in the respective tube section, said external and internal annular shoulders providing at least one part of said maintaining means.

29. A spindle liner according to claim 25 wherein each axial insert passageway has a first portion and a second portion and said first portion of the insert passageway tapers inwardly from one end of the tube insert to said second portion through which the bar stock to be worked can pass in a close fitting manner.

30. A spindle liner according to claim 26 wherein both said tube sections and said tube inserts are made of nylon.

31. A spindle liner according to claim 25 wherein each tube has a cylindrical exterior surface having a uniform diameter extending substantially

the length of the tube insert and each tube section is formed with an internal annular shoulder adapted to engage one end of the tube insert mounted in the respective tube section so as to stop the tube inset from moving further along the tube passageway when the liner is assembled for use.

32. A spindle liner according to claim 25 including a stop flange member adapted for connection to the spindle liner when the liner is assembled, said stop flange member being flat and having an outer diameter greater than said selected external diameter of each tube section.

33. A spindle liner according to claim 26 including a flat, disc-shaped, stop flange member having a central aperture and adapted for insertion between two of said tube sections near one end of the assembled spindle liner, said stop flange member having an outer diameter greater than said selected external diameter of each tube section and greater than the width of the feed passageway.